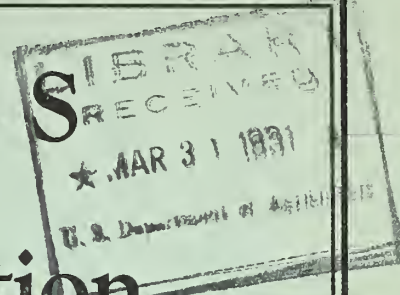


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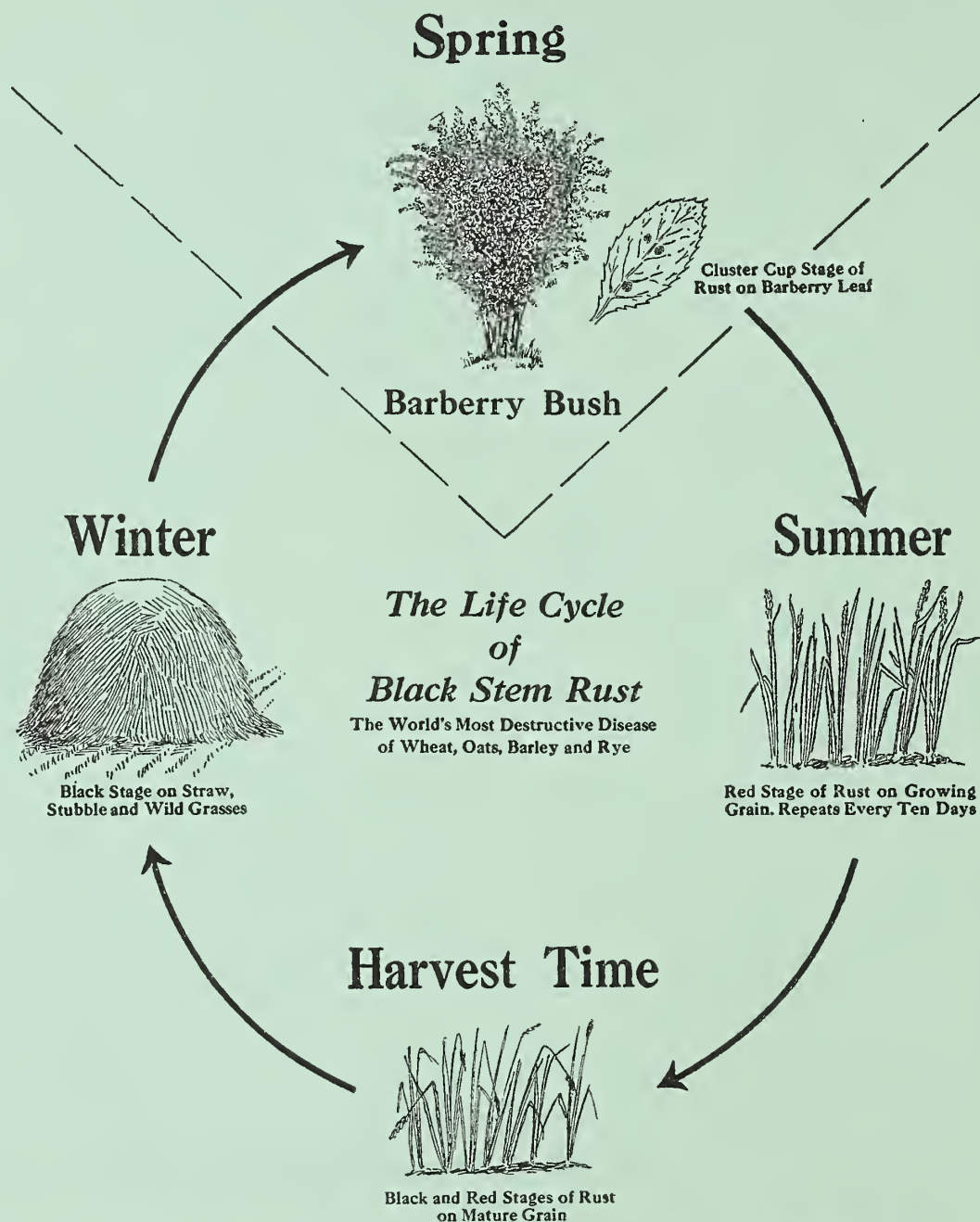
PROGRESS
of the
Barberry Eradication
Campaign
in
South Dakota in 1930



***Black Stem Rust Spread From This Common Barberry Bush
To Near-by Grain Fields Causing Severe Damage***

Barberry Eradication Pays

Remove the Barberry and Break the Rust Cycle



All Common Barberries act as starting points for Black Stem Rust early each spring. By destroying the barberry the early spring source of black stem rust is eliminated. The Common Barberry provides a means to bridge the gap between the black stage on grain in the fall and the red stage of the rust on grains and grasses the following spring.

**BOOST BARBERRY ERADICATION—A PRACTICAL RUST
CONTROL MEASURE**

PROGRESS OF THE BARBERRY ERADICATION CAMPAIGN

IN SOUTH DAKOTA, 1930

By R. O. Bulger,* Agent,

Office of Barberry Eradication, Bureau of Plant Industry
United States Department of Agriculture

Thirteen years have passed since the first organized effort was started in South Dakota and twelve other small grain States to reduce the number and severity of stem rust epidemics, through the eradication of common barberries. Prior to this time plant breeders had been working to produce varieties of grain which would resist the ravages of stem rust. Some progress was made but they found that their task was not an easy one. Varieties of grain were produced which at first appeared to be resistant but later were found to be susceptible to stem rust attack. In recent years it has been found that new forms of rust capable of attacking heretofore rust-resistant varieties of grains are produced on the barberry bush. The plant breeders' task of producing resistant varieties therefore will be considerably easier when all of the common barberries are eradicated.

As far back as 1660 a law against the growing of barberries was passed in Rouen, France. Later, laws prohibiting the growing of barberries within specified distances of grain fields, were enacted in most of the countries of western Europe. In our own country, the New England States passed laws against these offending bushes as early as 1726. All of these laws were passed because farmers noticed that stem rust was always more severe in the grain fields near these bushes than in those some distance away. It was not until 1865 that De Bary, a German scientist, definitely proved the relationship between common barberry bushes and black stem rust. Since that time many other investigators have

*Leader of Barberry Eradication in District No. 2.

verified the work of De Bary so that today there should be no doubt in the minds of people in regard to the merits of barberry eradication as a control measure for black stem rust.

The barberry eradication campaign was started in South Dakota in April, 1918. During the first two years only a few men were employed for the summer months, largely to make a preliminary survey to determine how many common barberries were growing in the State, and how big a job it would be to get rid of them. The results of this survey were surprising. It was found that South Dakota had a large number of these bushes and that in order to get them out it would be necessary to cover the entire State county by county. However, this did not tell the whole story. It merely gave a vague idea of what was ahead.

To find the greatest number of bushes in the shortest possible time the first survey was done hurriedly. Consequently many bushes were missed, although most of the large hedges and bushes were destroyed on this survey. As the campaign progressed the experience gained resulted in the building up of an organization which has eradicated more than 18 million of these rust-spreading bushes from the thirteen North-Central, grain-growing States. Of this number, approximately 134,000 have been found and destroyed in this State. We are not through yet. Splendid progress is being made, but the task will not be complete until the last barberry bush has been found and destroyed. Until that time we may expect some stem rust every year with the severity depending upon the kind of weather present during the growing season. It also is necessary to get every bush so that the danger of the State being reseeded to barberry bushes will be reduced to a minimum.

Organization of the Campaign

The demands of farmers and others interested in grain-growing for relief from the increasing epidemics of stem rust resulted in legislation against common barberry bushes and the organization of a campaign to find and destroy these bushes. In 1917, North Dakota began the eradication of

common barberries, and early in 1918, the present organization, in cooperation with the United States Department of Agriculture and the 13 North-Central grain-growing States, was effected. By 1919 laws or other regulations prohibiting the growing of barberries became effective in each of the 13 States involved in this project.

The barberry eradication campaign in South Dakota is directed by a District Leader under the supervision of the Office of Barberry Eradication, Bureau of Plant Industry, United States Department of Agriculture, Washington, D. C., and in cooperation with the South Dakota State College, State Department of Agriculture, and other State and civic organizations. The Conference for the Prevention of Grain Rust of Minneapolis, composed of representatives of agricultural and allied interests, cooperates closely with the campaign.

Barberry eradication has been financed largely by Federal funds, although in past years some money has been received from the State for this project. Splendid support and valuable indirect aid have been given by various organizations and institutions within the State. State aid is necessary in order that adequate Federal funds may be received to carry on the eradication in this State because part of the Federal appropriation must be matched by State funds. The total cost to the Federal Government and the State for finding and destroying nearly 134,000 barberry bushes in South Dakota has been approximately \$3.00 per farm. On the other hand, the annual stem rust loss in this State is estimated to have been about \$125 per farm. In certain years, before barberry eradication was started, the average loss was approximately \$800 per farm.

Activities of Barberry Eradication

The barberry eradication campaign consists of more than merely looking for barberry bushes and destroying them when found. There are three major phases of the work: (1) survey and eradication, (2) publicity and education, and (3) investigation. Each of these is necessary and is dependent upon the others.

Survey, of course, includes the problem of finding every bush in the entire State. It is an immense undertaking which requires not only a corps of trained men but the intelligent cooperation of every man, woman and child in South Dakota. Every foot of natural and planted timber must be carefully surveyed before one can say with assurance that no barberry bushes are present. Several different types of survey are necessary in some sections of the State, because of the fact that new barberry seedlings keep appearing year after year for some time. Seeds from the mother bushes are deposited by birds and by other means, and may then lie dormant for a considerable number of years before they begin to grow.

The eradication of barberries after they have been located is a comparatively easy job. Digging usually will not completely kill them, but common crushed rock salt or kerosene when properly applied at the roots is very effective. When bushes are found by people not thoroughly familiar with eradication methods, it is suggested that they report the location to the Barberry Eradication Office at South Dakota State College.

The educational program is an extremely important phase of the work. This includes the job of telling the facts regarding barberry and stem rust to the people of the State. Many questions are answered and the work is willingly explained to all. This phase of the campaign is the major activity during the late fall, winter, and early spring.

The purpose of the educational activity is to secure the support and cooperation necessary for a successful survey. The general public must be reached in an effective manner if the work is to be kept before the people of the State. Extensive use has been made of news articles, window displays, exhibits, demonstrations, bulletins, circulars, and circular letters. Talks, many of which are supplemented with lantern slides, film strips, and motion pictures are given at various gatherings.

Black Stem Rust

spreads from Common Barberry Bushes
to Wheat, Oats, Barley, Rye and many
Grasses



Black stem rust of small grains is caused by a tiny parasitic plant. In the Northern States it lives for a time each spring on the leaves of common barberry bushes. The dust-like spores of the rust are spread by the wind for miles from barberry bushes to grain fields and from one grain field to another. Warm, moist weather aids the rapid development and spread of stem rust, just as the growth of corn, wheat, or other crops is affected by favorable weather conditions. Destroy common barberry bushes and reduce losses from stem rust.

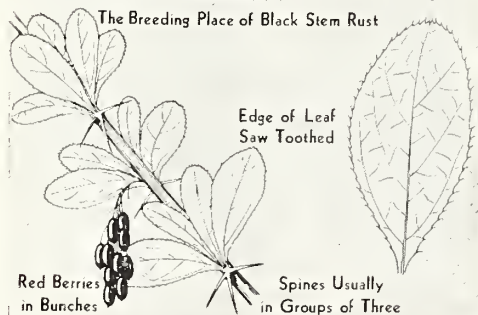
Learn to Know Common Barberry



COMMON BARBERRY

HARMFUL

The Breeding Place of Black Stem Rust



Edge of Leaf
Saw Toothed

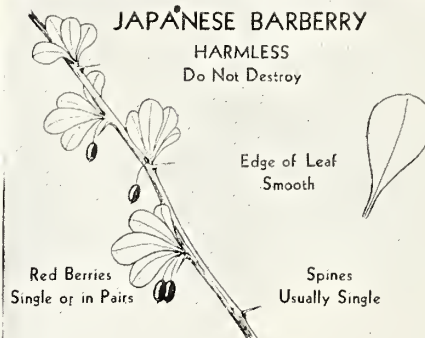
Red Berries
in Bunches

Spines Usually
in Groups of Three

JAPANESE BARBERRY

HARMLESS

Do Not Destroy



Edge of Leaf
Smooth

Red Berries
Single or in Pairs

Spines
Usually Single

Report common barberry bushes you may find, to the Barberry Eradication Office in your State, your Agricultural College, your State Department of Agriculture, or the Barberry Eradication Office, United States Department of Agriculture, Washington, D.C.

The chief educational work has been through the schools and colleges of the State. Important work has also been carried on through organizations, such as the 4-H Clubs, Young Citizens League, Boy Scouts, and others. The boys and girls and students in general are taught to recognize the barberry bush and understand the cause, life habits, and control of stem rust. The teachers and instructors are sent lesson plans, bulletins, circulars, charts, specimens, and other material to aid them in their work. Splendid co-operation has been received from the institutions of learning from the grade school to the University, and especially from the State Department of Public Instruction.

Investigational work provides a means of checking the efficiency of the work and determines ways of bringing about improvement. Investigation during past years has resulted in a considerable saving of time and money. Surveys are made each year to determine the prevalence and severity of stem rust and the damage that it has caused to small grain crops. The occurrence of stem rust in certain areas of the State has resulted in the finding of barberry bushes which may not have been located for several years. Investigational work to determine the effectiveness of the other phases of the campaign is also carried on, as well as a study of the personnel with an idea toward its improvement.

The United States Department of Agriculture and the experiment stations in the barberry eradication area conduct investigations which include: (1) the epidemiology of stem rust; (2) the classification of barberries and other closely related plants; (3) testing barberry species, varieties, and hybrids for their susceptibility to stem rust; (4) studies in connection with chemical eradication; (5) ecological studies; and (6) breeding experiments to produce varieties of small grain resistant to stem rust.

Problems of Survey, Eradication, and Education

The task of covering a county section by section and being sure that no barberry bushes have been missed, is not an easy matter. In some counties it is almost humanly

impossible to survey the territory and be sure that no bushes are missed. Even if this were accomplished, there still would be danger of the territory becoming reinfested from the seeds that may be lying in or on the ground. For this reason it will be necessary to make several surveys in some counties before they can be pronounced free from these rust-spreading bushes.

There is also the danger of common barberries being brought into the State from outside sources. A strict quarantine has been established to prohibit the shipping of barberry bushes, yet occasionally some plants are brought into the State without being inspected. The seeds of common barberries are sometimes carried by travelers who are returning to this State. In several instances new bushes have grown up from the seeds brought into the State in this manner.

Some people still believe that the weather is the real cause of rust. It is difficult for them to understand how an innocent-looking shrub like a barberry bush can have anything to do with stem rust. Favorable weather is, of course, necessary for the development of stem rust, but the weather itself can never cause the disease. Stem rust is comparable to the diseases that affect humans and animals, in that a germ or spore is responsible for its beginning. This rust spore must begin its growth on the leaves of the common barberry bush every spring in South Dakota.

The task of educating the general public relative to the merits of the barberry eradication campaign is a real problem. Considerable progress has been made, but there is a large amount of work ahead before the campaign will be fully understood by people in general.

The above are some of the problems ahead in this project. Many more could be mentioned but these are typical examples.

Summary of all Activities, 1930

Approximately five and one-half counties were covered by an intensive survey for common barberries this year. The work was carried on in Aurora, Brule, Buffalo, Davison, Hanson Counties, and about one-half of Hand County. In these counties all places where shrubs can grow were inspected.

Seventy-seven barberry bushes, seedlings and sprouting bushes were found this year on 21 different properties. This relatively small number found is not suprising, in view of the fact that the territory covered this year is not one of the older settled portions of the State, and as a result fewer trees and shrubs are present than in many other counties. It must be remembered, however, that in an open type of territory, one common barberry bush may do considerable damage.

A stem rust survey was again carried on this year. While stem rust caused little damage over the State as a whole, there were three areas of rust that appeared to be due to inoculum from local sources. These areas check closely with similar areas observed for the past few years.

It is interesting to know that an area surrounding Mitchell, South Dakota, has been the apparent center for stem rust infection for the past few years. This year the survey of Davison County located a total of 40 barberries on eight different properties. These have undoubtedly been the cause of considerable stem rust in the past. It is believed that these stem rust surveys aid a great deal in locating missed bushes.

Educational and publicity work again received considerable attention. The major part of this work was carried on through schools and colleges. Talks were given before a large number of high schools, a few colleges, and the grade schools in one county. Material to aid the teacher in teaching this subject was given to all the grade schools in 21 different counties. Several other special projects

were undertaken which included talks at agricultural short course meetings, agronomy field days, and various other meetings of business and agricultural men. Publicity work was again carried on through newspapers and magazines.

The educational and publicity work for 1930 may be summarized as follows: there was a total of 28 demonstrations held throughout the State consisting of fair demonstrations, field demonstrations, window displays and miscellaneous demonstrations. Speakers were furnished for 125 different gatherings. A total of 356 news articles appeared in South Dakota papers during 1930. More than 35,000 pieces of educational and publicity material were sent to various people throughout the State. About 1800 literature filing cases were presented to rural teachers, town teachers and other people in 21 different counties. The film "Rust" was shown to approximately 7,000 people in South Dakota.

Future Plans

The survey for barberry bushes by trained men must continue until every county in the entire State has been carefully covered. It then will be necessary to revisit certain properties and rework certain areas to destroy barberries that have grown from seed since the last survey. This program of work will take a considerable number of years.

Public interest must be increased so that a constant watch will be kept by the citizens of the State to prohibit new bushes from getting started. More effective educational and publicity work is necessary to accomplish this end. People who thoroughly understand the work are usually good supporters. Opposition and lack of interest come from those who are not familiar with the facts regarding the common barberry and stem rust.

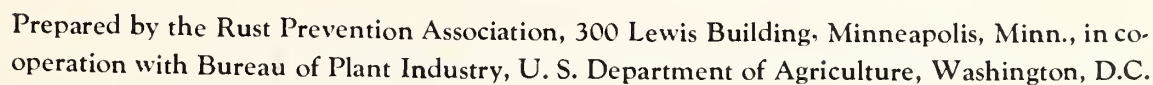
Other Control Measures

Barberry eradication is not the only control measure for stem rust. Several other methods of controlling this

Birds, animals and man chiefly are responsible for the wide distribution of the seeds of common barberries. Every fence row, thicket, pasture or wood is a possible hiding place for these bushes.

NUMBERS OF BARBERRY BUSHES AND SEEDLINGS
DESTROYED 1918-1930

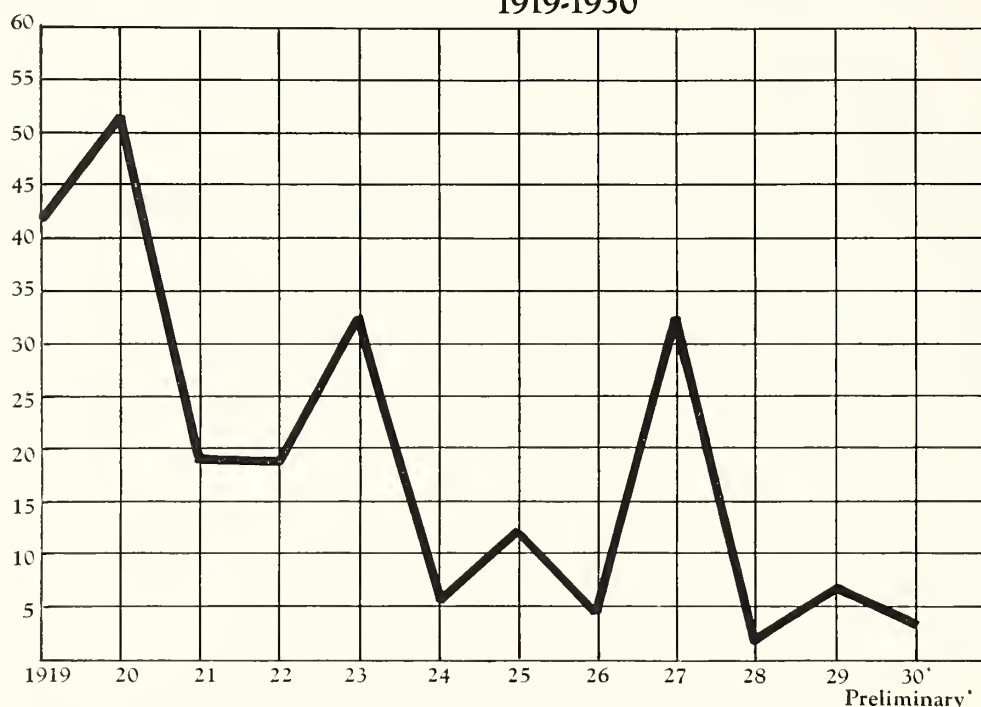
SUMMARIZED RESULTS	
ITEM	DESTROYED
BUSHES	7,190,831
SEEDLINGS	10,803,050
SPROUTING	
BUSHES	318,902
GRAND TOTAL	18,312,783



Barberry Eradication Pays

In Millions
of Bushels

Wheat losses in Barberry Eradication Area
1919-1930



The losses to small grain crops caused by black stem rust have been reduced since the beginning of the barberry eradication campaign in 1918. The breeding of rust-resistant varieties, the use of early maturing varieties, and the sowing of crops early, have aided in this reduction.

**57,704,000
bushels of wheat**

Average annual loss
five-year period
1916-1920

**17,867,000
bushels of wheat**

Average annual loss
five-year period
1921-1925

**9,609,000
bushels of wheat**

Average annual loss
five-year period
1926-1930

Millions of bushels of oats, barley and rye also are
damaged each year by black stem rust

Rust shriveled grain always is discounted

Destroy all Common Barberries—Reduce Losses from Stem Rust.

Receive the Highest Available Price for Grain.

disease are important and should receive the attention of every grain grower. No single method will entirely eliminate black stem rust, but a combination of all of them will reduce the losses to a point where they will be of no serious consequence.

It is definitely known that certain varieties of wheat, oats, and barley ordinarily do not rust so much as other varieties. These rust-resistant crops should be grown if they are desirable from the standpoint of yield, milling quality, resistance to other plant diseases, and if they are of good market value. Unfortunately no rust-proof grain has yet been found. Plant breeders have been working on this problem for years and have made excellent progress, considering the many difficulties encountered. The search for resistant grains should be encouraged along with barberry eradication.

The production of rust-resistant varieties of grains probably will be much more successful, however, when all common barberry bushes have been eradicated. The reason for this is shown in the recent important discoveries made in the Canadian Rust Research Laboratories at Winnipeg, Manitoba, and by E. C. Stakman and his co-workers at the University of Minnesota. Both of these groups, conducting independent research, proved that entirely new strains of the destructive black stem rust are produced if two different forms of the rust crossbreed on the barberry leaves. The certainty that new forms of the dangerous disease may appear suddenly, makes the eradication of the common barberry all the more imperative, since it is on the barberry alone that this crossing can occur in nature. The new and apparently resistant varieties of grains are not safe with barberries near. If for no other reason than to protect the new kinds of super wheat which are now in the process of being developed, all common barberry bushes should be destroyed.

Two ways of preventing excessive losses from stem rust also are recommended. These are: (1) the sowing of crops as early as possible in the spring; and (2) the sowing of varieties that mature early. When crops ripen early,

either because they have been sown early or because the particular variety normally ripens early, stem rust usually causes little damage.

Control Measures for Other Rusts

There are more than 2,000 species of plant diseases known as rusts. Barberry eradication will not control all of these rusts, but it will materially reduce the damage caused by black stem rust, which is the most destructive cereal disease in this State.

A rust known as orange leaf rust appears on wheat in South Dakota nearly every year. In some seasons this disease causes serious damage. It may be easily distinguished from stem rust. The rusty spots occur more commonly on the leaves. They are orange in color and circular in shape. Stem rust occurs commonly on the stem in oblong spots brick-red to dark-red in color.

There also is a leaf rust of oats which may cause considerable loss. In addition there are leaf rusts of rye and barley. In some seasons a disease known as flax rust causes serious damage to the flax crop.

It should be thoroughly understood that barberry eradication will control only stem rust. The other rusts must be controlled by different methods. The breeding of varieties resistant to these diseases gives the greatest promise for control.

Conclusion

It is fortunate for the people of South Dakota that the campaign to eradicate common barberries was started twelve years ago. Every year the situation was getting worse. Stem rust epidemics were common; losses were severe. The barberry bushes present were producing quantities of seeds each year which were being distributed about the State causing the number of bushes to increase rapidly. In many Eastern States barberries are so plentiful that it will

take years to clean up the entire State. The situation here would have been similar if the bushes had continued to grow unmolested a few more years. As it is, South Dakota will eventually be free of common barberry bushes, much sooner than some of the grain-growing States in the eastern part of the area.

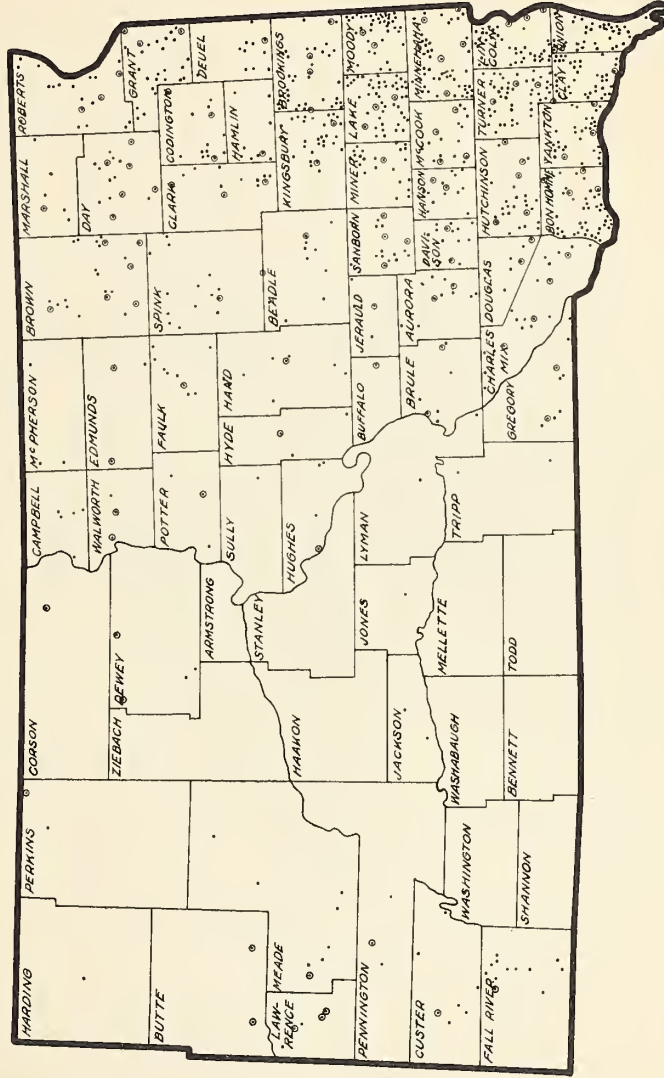
Barberry eradication is a safe and sane sanitation measure. As no progressive livestock farmer would voluntarily allow an animal affected with tuberculosis to remain in his herd, neither should he permit a common barberry to grow on his farm or in his community. One small barberry not only may start an epidemic of stem rust, but in time it will cause the entire community to become reinfested with additional rust-spreading bushes. Therefore, this campaign will not be completed until the last common barberry bush has been found and eradicated.

Every citizen may help by reporting to the Barberry Eradication Office located at the State Agricultural College, Brookings: (1) any bushes that he suspects of being harmful barberry, and (2) grain fields that are heavily infected with black stem rust.

Acknowledgment is also made to all of the field men in South Dakota and especially to George M. Frandsen, Assistant Leader, for suggestions and compilation of data.

PROPERTIES HAVING BARBERRY BUSHES 1918-1930

SOUTH DAKOTA



1,320 PROPERTIES
133,809 BUSHES

• FARMS HAVING BARBERRY BUSHES
• TOWNS HAVING BARBERRY BUSHES

Common Barberry Spreads Black Stem Rust

COMMON BARBERRY

HARMFUL

The Breeding Place of Black Stem Rust



Edge of Leaf
Saw Toothed



Red Berries
in Bunches

Spines Usually
in Groups of Three

JAPANESE BARBERRY

HARMLESS

Do Not Destroy



Red Berries
Single or in Pairs

Edge of Leaf
Smooth



Spines
Usually Single

Look For and Report All Common Barberry Bushes
To the State Leader of Barberry Eradication, in care of your State Department of Agriculture or your State Agricultural College.

Common Barberry Bushes

spread

Black Stem Rust

to

WHEAT, OATS,
BARLEY, RYE,
and Many Wild
Grasses

THIS Progress Report is prepared and printed by the Bureau of Plant Industry, U. S. Department of Agriculture, Washington, D. C. The cover is furnished by the Conference for the Prevention of Grain Rust, 300 Lewis Building, Minneapolis, Minnesota.